TM 9–1710A
(9–1710)

WAR DEPARTMENT

TECHNICAL MANUAL

ORDNANCE MAINTENANCE

POWER TRAIN (AXLES, TRANSMISSION, AND PROPELLER SHAFT) FOR HALF-TRACK VEHICLES

July 18, 1942

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SECTION I

GENERAL

1. Scope.—*a.* This manual is published for the information and guidance of ordnance maintenance personnel, and is the first of three maintenance manuals for half-track vehicles. It contains detailed instructions for inspection, disassembly, assembly, maintenance, and repair of the power train (axles, transmission, and propeller shafts) for half-track vehicles, supplementary to those in the Field and Technical Manuals prepared for the using arm. Additional descriptive matter and illustrations are included to aid in providing a complete working knowledge of the matériel.

b. Vehicle generally.—Information is included concerning the service maintenance, technical inspection, and lubrication of the entire vehicle.

c. Power train specifically.—Information is also included concerning the detailed description, operation, inspection and trouble diag-

nosis, disassembly, maintenance and repair, assembly, and test of major components of the axles, propeller shafts, and transmission, supplementing TM 9–710, prepared for the using arms.

d. Chassis and body.—For maintenance information concerning the chassis and body components, refer to TM 9–1712.

e. Power plant.—For maintenance information concerning the engine and its accessories, refer to TM 9–1711.

SECTION II

SERVICE MAINTENANCE

2. Objective.—There is a distinct difference between the missions of organizational maintenance and of service maintenance. Organizational maintenance by the using arms has for its prime objective the routine preventive maintenance, care, and adjustment of vehicles so they will be in good operating condition at all times with a minimum loss of time for repairs. Service maintenance by light and heavy maintenance organizations of the Ordnance Department has, for its prime objectives, supply, technical inspection and corrective action, and repairs beyond the capacity of the using arms. These are accomplished either by unit replacement, overhauling, rebuilding, reclaiming, manufacturing, or any other methods considered most suitable.

3. Scope.—The scope of maintenance and repairs by maintenance personnel is determined by the amount of time available, weather conditions, concealment, shelter, proximity to hostile fire, equipment, tools, and parts available, besides skill of the personnel. Since all of these factors are variable, no exact system or procedure can be prescribed or followed.

4. Allocation of repair jobs.—The operations herein augment those which may be performed by personnel of the using arms.

a. Front and rear (jackshaft) axles.—(1) *Alinement.*—Check and adjust for camber and caster.

(2) *Axle assembly.*—Replace, repair, or rebuild.

(3) *Axle housing.*—Repair, weld, machine, and aline.

(4) *Gear and pinions.*—Adjust.

(5) *Steering knuckles.*—Replace or rebush.

(6) *Wheel turning stop.*—Adjust.

b. Body.—See TM 9–1712.

c. Bogie suspension and track.—See TM 9-1712.
d. Brakes.—See TM 9-1712.
e. Cooling system.—See TM 9-1711 and 9-1712.
f. Electric generating and starting system.—See TM 9-1711.
g. Electric ignition system.—See TM 9-1711.
h. Electric lighting system and accessories.—See TM 9-1712.
i. Engine.—See TM 9-1711
j. Frame.—See TM 9-1712.
k. Fuel system.—See TM 9-1711 and 9-1712.
l. Instruments.—See TM 9-1712.
m. Propeller shafts.—Repair or rebuild.
n. Shock absorbers and springs.—See TM 9-1712.
o. Steering gear.—See TM 9-1712.
p. Transmission.—(1) *Shift levers.*—Repair.
(2) *Transfer case components.*—Replace, repair, or rebuild.
(3) *Transmission components.*—Replace, repair, or rebuild.
q. Wheels.—See TM 9-1712.

SECTION III

TECHNICAL INSPECTION

5. Description.—Technical inspections are a follow-up and check on organizational maintenance inspections and other maintenance functions. They determine whether the vehicle should be continued in service or withdrawn from operation for overhaul. These inspections are covered in AR 850-15.

6. Inspection form (fig. 1).—W. D., Q. M. C. Form No. 260 (Technical Inspection Report of Motor Vehicles) is the standard and official form for recording the inspection of all motor vehicles, including combat vehicles of the Ordnance Department. The extent to which use is made of this form or modification of it depends entirely on the technical ability of available personnel, the time factor, and the test and shop equipment available.

7. Practical application.—*a. External inspection of body and frame components.*—(1) *Toe-in.*—Check (refer to front axle).
(2) *Caster and camber.*—Check (refer to front axle).
(3) *Other body and frame components.*—Refer to TM 9-1712.
b. External inspection of chassis components.—(1) *Front axle.*—Inspect for straightness. Shake wheels to check for "wobble." Inspect

WAR DEPARTMENT
QMC Form No. 360
App. Oct 16, 1939

TECHNICAL INSPECTION REPORT OF MOTOR VEHICLES

This form indicates the scope of complete technical inspection of all motor vehicles for all echelons. It does not prescribe a required routine of procedure. Items will be checked to the extent of ability of personnel and adequacy of equipment available.

Date _____

Vehicle nomenclature _____

U. S. A. Registration No. _____ Mileage _____

Organization _____ Station _____

Supply arm or service maintaining vehicle _____

(Check V, is satisfactory, × adjustment made, ×× repair or replacement needed)

EXTERNAL INSPECTION

1. Bumpers
2. Boards, running
3. Body
4. Bows
5. Camber**
6 Carrier, tire
7. Caster**
8 Curtains
9 Doors
10. Fenders
11. Gate, tail
12. Glass
13. Guards, headlight
14 Guard, radiator
15. Hood
16. Hooks, tow
17. Lights
18. Paint
19. Pintles
20 Radiator
21. Tires
22 Top
23. Toe-in
24.
25.

HOOD UP (ENGINE STOPPED)

26 Antifreeze
27. Assembly, breaker pt
28 Baffles, inter-cyl *
29. Battery
30. Belt, fan
31 Cleaner, air
32 Compressor, air
33 Engine, oil
34. Fan, cooling
35. Filter, fuel
36 Filter, oil (external)
37 Filter, oil (in eng)*
38 Fluid, brake
39. Governor, seal
40. Housing, steering gear
41. Pump, water
42. Shroud, engine*
43. Spark plugs
44. Strainer, fuel pump
45. Strainer, scavenge oil*
46. System, fire extng *
47.
48

HOIST VEHICLE (if practicable)
(Except full track and rear end of half-track vehicles)

49 Axle, front
50 Axle, frt drive, lubr'n
51. Axle, rear
52 Axle, rear, lubr'n
53 Body, bolts
54 Engine, side pans
55 Frame, distortion
56 Frame, rivets
57 Joints, universal
58 Lines, brake (hydr.-air)
59 Linkage, brake (mech)
60 Linkage, steering
61 Shafts, propeller
62 Spring, front assembly
63 Spring, rear assembly
64 Shock absorbers, fill
65 Tank, air
66. Trf case-sub-trans
67 Trf. case-sub-tr, lubr'n
68. Transmission
69. Transmission, lubr'n
70. Wheels, front, adjustment and trueness
71 Wheels, front, lubr'n
72 Wheels, rear
73
74
75.

INTERNAL INSP. (START ENGINE)

76. Ammeter
77 Accelerator
78 Choke
79 Cut-out
80 Extinguisher, fire
81. Filter, trans oil*
82 Gage, air
83 Gage, fuel
84 Gage, oil
85 Generator
86. Horn
87 Indicator, heat
88 Insulation, hull*
89 Lights
90. Pad, protecting*
91 Protector, peep hole*
92 Pump, priming*
93 Seats, troop
94. Starting motor
95. Switch, battery*
96. Switch, ignition
97. Switch, mesh starter*
98. Switch, sol starter*
99. Switch, starter
100 Tachometer*
101 Tools
102. Throttle
103 Upholstery
104 Wiper, windshield
105 Viscometer
106 Voltmeter*
107.
108.

HOOD UP (ENGINE RUNNING)

109. Engine noise
110. Engine, smoothness
111. Engine mounting
112. Gaskets (all)
113. Leaks, fuel
114. Leaks, oil
115. Leaks, water
116 Valves, noise
117. Wiring, ignition
118. Wiring, other
119.
120.
121.

ROAD TEST VEHICLE

122 Body, noise
123. Brakes, hand
124 Brakes, service
125 Brakes, steering*
126. Clutch
127 Drive units, noise
128 Engine, noise
129. Engine, smoothness
130. Engine, power
131. Gear shift
132 Governor
133. Shock absorbers
134 Speedometer
135. Steering mechanism
136
137
138
139.
140.

* Ordnance vehicles.

** Normally 3d and 4th echelons.

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FIGURE 1.—Technical inspection report.

cross tube. Check for oil leaks and cracked housing. Test all nuts with wrench. Inspect brush guards and universal joint dust shields. Check presence of necessary plugs and lubrication fittings and evidence of proper lubrication. Inspect breather.

(2) *Transmission.*—Inspect for leaks and cracked case. Test all bolts with wrench. Check presence of necessary plugs and lubrication fittings and evidence of proper lubrication. Inspect breather.

(3) *Propeller shafts.*—Inspect for distortion and fractures. Examine flanges. Test all nuts with wrench. Tighten dust caps. Check lubrication and relief valves.

(4) *Rear axle.*—Check for oil leaks and cracked housings. Test all nuts with wrench. Check presence of necessary plugs and lubrication fittings and evidence of proper lubrication. Inspect breather.

(5) *Other chassis components.*—Refer to TM 9-1712.

c. Road test.—(1) *Clutch.*—Check for smoothness of operation. Test for effectiveness by setting drive shaft brake or using the service brakes, putting the vehicle in low gear, and releasing the clutch pedal gradually; if the clutch is efficient, the engine should stall.

(2) *Gear box.*—Listen to transmission and transfer case gears for a high-pitched whine or squeal which indicates internal misalinement. In shifting gears, it is usual for the two lower speeds to be much noisier in operation than high gear; unusual noises in the transmission during operation in the high gears should be investigated immediately to avoid severe damage.

(3) *Gear shift.*—Check to see that the gear shift levers are fastened firmly in their retaining sockets and that the gear shift forks on the lower end of the levers move properly through all gear changes selected.

(4) *Steering mechanism.*—Note if steering wheel has a tendency to jerk; such action indicates a looseness in the steering mechanism connection from the front axle to the wheel, or an error in steering geometry. Note any tendency on the part of the vehicle to wander or drive to the right or left, indicating improper adjustment of steering mechanism or brakes, or an error in steering gear geometry. If a thump or knocking is felt in the steering wheel, a part is probably loose in the steering gear worm.

d. Inspection of other components.—See TM 9-1711 and 9-1712.

SECTION IV

LUBRICATION

8. General.—Lubrication is an essential part of preventive maintenance, determining to a great extent the serviceability of parts and assemblies. Lubrication or the lack of it influences repairs and operations materially, and is one of the most important factors affecting dependable service and useful vehicle life. Refer to Ordnance Field Service Bulletin 6–1 for a description of the ordnance lubrication program and see Lubrication of Ordnance Matériel.

9. Schedules (fig. 2① and ②).—*a. Records.*—A complete record of lubrication will be kept for every vehicle. Responsible personnel will execute a check sheet at regular intervals to indicate the actual mileage and date at which each component receives such attention as prescribed.

b. Supplies.—Lubricants and application equipment should conform to recommendations of the Ordnance Department. Refer to OFSB 6–4 for the product guide. During field service, it may not be possible to supply a complete assortment of lubricants called for by the schedule to meet the recommendations and it will be necessary to make the best use of those available, subject to inspection by the motor officer concerned in consultation with responsible ordnance personnel.

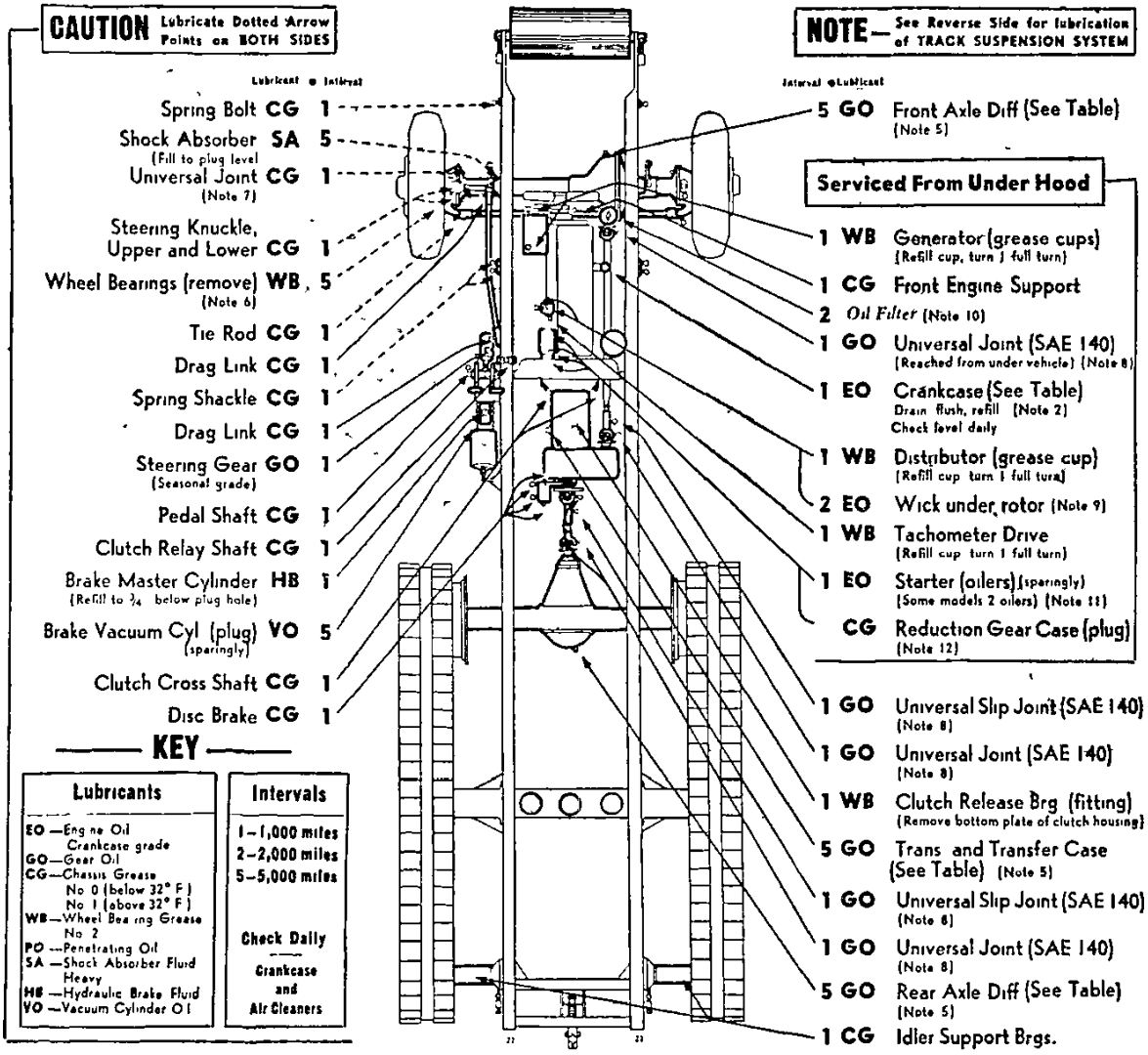
10. Methods.—*a. Application.*—Refer to OFSB 6–2 for general lubricating instructions.

b. Low-temperature lubrication.—Refer to section III, OFSB 6–G–3, for information which supplements the lubrication guides in connection with chassis, crankcase, and gear lubricants utilized in temperatures below minus 10° F.

c. Rubber parts.—Friction and vibration tend to develop squeaks, groans, and improper fit of rubber parts in chassis, instrument panel accessories, and engine mounts. Lubricants such as mineral oil, castor oil, engine oil, or other greases must not be used because they tend to swell or rot the rubber. A suitable lubricating material can be made by mixing colloidal graphite with ethylene glycol or glycerin. Add enough water to prevent rapid drying before the solution has penetrated. The solution can be applied with an ordinary spray, but a needle spray will be needed to force the

TABLE OF CAPACITIES AND RECOMMENDATIONS

	Capacity	Above 90°	Lowest Expected Atmospheric Temperature				
			+32°	+10°	−10°	−30°	Below −30°
Crankcase	12 qt	SAE 30	SAE 30	SAE 30	SAE 10	For operation in these temperature ranges, refer to OFSB 6-G-3.	
Trans and Transfer Case	7½ qt	140	140	90	80		
Differential (Front)	3½ qt						
Differential (Rear)	6 qt						



NOTES Additional Lubrication and Service Instructions on Individual Units and Parts NOTES

1 AIR CLEANERS—(Engine) Check level and refill oil cup to bead level daily with EO Drain clean and refill every 100 to 1 000 miles depending on operating conditions Every 2 000 miles also remove air cleaner and wash all parts (Brake Vacuum Cylinder) Every 3 months remove brake vacuum cylinder air cleaner located under hood clean hair and oil with EO

2 CRANKCASE—Drain only when engine is hot Flush with 8 qt SAE 10 idle engine 5 minutes and drain Refill to FULL mark on gage CAUTION Be sure pressure gage indicates oil is circulating See Table

3 INTERVALS indicated are for normal service For extreme conditions of speed heat water mud snow rough roads dust, etc, change crankcase oil and lubricate more frequently

4 FITTINGS—Clean before applying lubricant Lubricate until new grease extrudes from the bearing CAUTION Always lubricate chassis points after washing vehicle

5 GEAR CASES—Check level every 1 000 miles add lubricant if necessary Drain flush and refill at end of first 1 000 miles thereafter as indicated on guide Check with vehicle on level ground

6 FRONT WHEEL BEARINGS—Remove wheel clean and repack bearings, also remove, clean and lubricate spindle bushing with WB

7 UNIVERSAL JOINTS (Front wheels)—Remove level plugs fill through rear plug hole until lubricant is level with opposite hole Every 5 000 miles remove, clean inspect and reassemble universal joints Remove plug in spindle insert fitting and inject 1 lb CG Replace plug Refill universal joint housing

8 UNIVERSAL JOINTS AND SLIP JOINTS—Apply lubricant to joint until it overflows at relief valve end to slip joint until lubricant extrudes from vent at universal joint end of spline

9 DISTRIBUTOR—Wipe distributor breaker cam lightly with CG and lubricate breaker arm pivot with EO sparingly every 2 000 miles.

10 OIL FILTER—Renew filter element every 2 000 miles or oftener if necessary After renewing element, refill crankcase to FULL mark on gage

11 STARTER—Remove starter every 5 000 miles, clean, and lubricate Bendix drive sparingly with PO Lubricate Bendix drive shaft outer bearing through oiler with EO

12 STARTER REDUCTION GEAR CASE—Every 6 months remove plug in top of housing and refill with CG

13 OIL CAN POINTS—Lubricate throttle ends clevises, hinges latches vacuum cylinder valve and power lever linkage bumper roller slides and bushings and points with EO every 1 000 miles

14 POINTS REQUIRING NO LUBRICATION— Springs Shock Absorber Links, Bumper Roller Brgs Water Pump and Fan

15 POINTS TO BE LUBRICATED BY ORDNANCE MAINTENANCE PERSONNEL AT TIME OF GENERAL OVERHAUL— Clutch Pilot Bearing, Speedometer Cable (See OFSB 6 G 102)

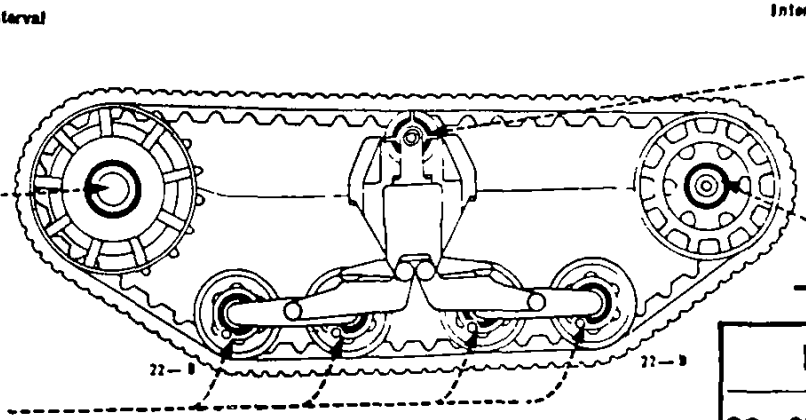
CHEK CHART No 23

RA PD 3502C

①

FIGURE 2.—Lubrication chart.

HALF TRACK SUSPENSION SYSTEM



CAUTION Lubricate Suspension System Points On Both Sides of Vehicle

SIDE VIEW

KEY

Lubricants	Intervals
CG—Chassis Grease No. 0 (below 32° F.) No. 1 (above 32° F.)	1—1,000 miles
WB—Wheel Bearing Grease No. 2	5—5,000 miles

NOTES **Additional Lubrication and Service Instructions on Individual Units and Parts** **NOTES**

1. INTERVALS indicated are for normal service. For extreme conditions of speed, heat, water, mud, snow, rough roads, dust, etc., lubricate more frequently.
2. FITTINGS—Clean before applying lubricant. Lubricate until new grease extrudes from the bearing. CAUTION: Always lubricate suspension points after washing vehicle.
3. JACKSHAFT DRIVE SPROCKET BEARINGS —Remove tracks, drive sprocket flanges and bearing hub. Also remove, clean and repack bearings.
4. POINTS REQUIRING NO LUBRICATION— Coil Springs, Bogie Wheel Suspension Linkage and Slides.

CHEK CHART No. 23

RA PD 3502D

②

FIGURE 2.—Lubrication chart—Continued.